

## PATENT ABSTRACTS OF JAPAN

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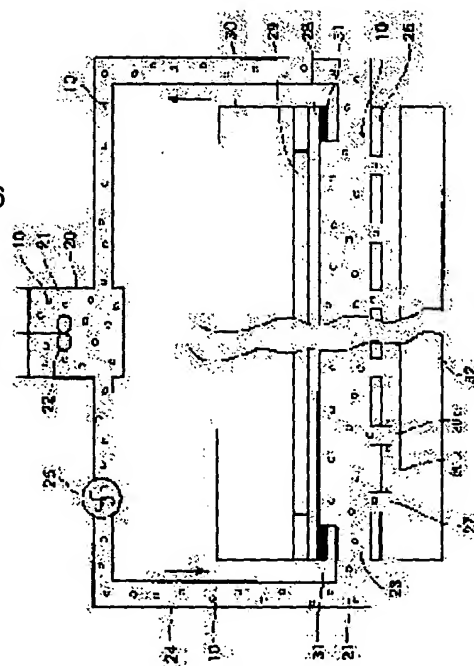
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## (54) MEHOD AND DEVICE FOR SPRAYING SPACER

## (57)Abstract:

PROBLEM TO BE SOLVED: To spray spacers only onto a position corresponding to a black matrix of a color filter with respect to a glass substrate for a color liquid crystal display device and to attach them thereto.

SOLUTION: The diameters of openings 27 formed on a perforated plate 26 provided on a reservoir 23 of a spacer carrying liquid 21 are equal to the widths of the black matrix and their distances are equal to the lateral widths of respective R, G, B regions of the color filter partitioned by the black matrix. On driving a piezoelectric effect plate 29, the spacers 10 are spurted from the openings 27 and sprayed on the alignment treated glass substrate 32. The spacers 10 are attached only to the position corresponding to the black matrix.



## LEGAL STATUS

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CLAIMS

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[Claim(s)]

[Claim 1] The spacer sewage sprinkling characterized by sprinkling a spacer only to the part of the black matrix of a light filter by injecting the spacer carrier liquid containing many spacers through opening of a predetermined interval to the glass substrate for an electrochromatic display by which orientation processing was carried out.

[Claim 2] A supply means to supply the spacer carrier liquid containing many spacers, An opening means to have two or more openings prepared at intervals of predetermined so that the glass substrate for an electrochromatic display by which is the one side of a storage means to store the supplied above-mentioned spacer carrier liquid, and the above-mentioned storage means, and orientation processing was carried out might be countered, It is spacer spraying equipment which is equipped with an injection means to inject the spacer carrier liquid prepared in the other side of the above-mentioned storage means to the above-mentioned glass substrate through the above-mentioned opening, and is characterized by the interval of the above-mentioned opening corresponding to the part of the black matrix of a light filter.

[Claim 3] The above-mentioned injection means is spacer spraying equipment according to claim 2 characterized by the bird clapper from a piezoelectric-effect board and a diaphragm.

[Claim 4] The aforementioned supply means is spacer spraying equipment according to claim 2 or 3 characterized by consisting of the pump formed in the propeller which stirs the spacer carrier liquid in the tank of spacer carrier liquid, and this tank, the circulation way which opens the above-mentioned tank and the aforementioned storage means for free passage, and this circulation way.

[Claim 5] The path of the aforementioned opening is spacer spraying equipment according to claim 2 the interval of whose it is 20micro and is 80micro.

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DETAILED DESCRIPTION

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[Detailed Description of the Invention]

[0001]

[The technical field to which invention belongs] this invention relates to the spacer sewage sprinkling to the glass substrate for an electrochromatic display display, and improvement of equipment.

[0002]

[Description of the Prior Art] The structure of the screen of electrochromatic display display (LCD) is constituted as shown in a schematic diagram 4. this drawing -- setting -- 1 and 1' -- for a transparent electrode, and 6 and 7, as for a light filter and 9, an orientation film and 8 are [ a glass substrate, and 4 and 5 / a polarizing plate, and 2 and 3 / liquid crystal and 10 ] spacers

[0003] It \*\*, and as a light filter 8 is shown in drawing 5 , three kinds of zones, R, G, and B, exist by turns, and a part for the region is divided by the black matrix 11. Usually, the length for the above-mentioned region is 300micro, width is 80micro, and the width of face of a black matrix is 20micro. Moreover, it is the spherical particle used in order to keep the gap of liquid crystal 9 uniform, and a spacer 10 is about 2-6micro in diameter, and it is mixed into carrier liquid and it is sprinkled on the glass substrate by which orientation processing was carried out. Orientation processing is preparing a transparent electrode, an orientation film, etc. in a glass substrate, and is performing processing required for a glass substrate here.

[0004]

[Problem(s) to be Solved by the Invention] However, the sewage sprinkling of the above-mentioned spacer 10 was what sprinkles spacer carrier liquid extensively on a substrate by the nozzle conventionally. For this reason, a spacer 10 will be sprinkled also in each zone of R, G, and B of a light filter 8, as shown in drawing 6 , consequently it had the fault that the luminosity of coloring decreased or coloring unevenness arose.

[0005] The purpose of this invention is to provide only the part of the black matrix of a light filter with the method and equipment which can sprinkle a spacer in order to improve the fault of this conventional technology.

[0006]

[Means for Solving the Problem] In order to attain the above-mentioned purpose, the spacer sewage sprinkling of this invention makes it a summary to sprinkle a spacer only to the part of the black matrix of a light filter by injecting the spacer carrier liquid containing many spacers through opening of a predetermined interval to the glass substrate for an electrochromatic display display by which orientation processing was carried out.

[0007] Moreover, a supply means to supply the spacer carrier liquid with which the spacer spraying equipment of this invention contains many spacers, An opening means to have two or more openings prepared at intervals of predetermined so that the glass substrate for an electrochromatic display display by which is the one side of a storage means to store the supplied above-mentioned spacer carrier liquid, and the above-mentioned storage means, and orientation processing was carried out might be countered, Having an injection means to inject the spacer carrier liquid prepared in the other side of the above-mentioned storage means to the above-mentioned glass substrate through the above-mentioned opening, the interval of the above-mentioned opening makes it a summary to correspond to the part of the black matrix of a light filter.

[0008] In the equipment of this invention, the above-mentioned injection means may consist of a piezoelectric-effect board and a diaphragm. Moreover, the aforementioned supply means may consist of pumps formed in the propeller which stirs the spacer carrier liquid in the tank of spacer carrier liquid, and this tank, the circulation way which opens the above-mentioned tank and the aforementioned storage means for free passage, and this circulation way. Furthermore, the path of the aforementioned opening is 20micro and it is suitable for it that the interval sets to 80micro.

[0009]

[Embodiments of the Invention] As shown in drawing 1, the spacer sewage sprinkling of this invention sprinkles a spacer 10 on a glass substrate from opening (a diameter is the same as width of face of 20micro of the black matrix 11) of the same interval as 80micro of breadth of the zone of R, G, and B so that a spacer 10 may be sprinkled only in the black matrix 11 which divides R, G, and B of a light filter 8.

[0010] Drawing 2 shows one example of the spacer spraying equipment of this invention for enforcing the above-mentioned method. In this drawing, 20 is the service tank of spacer carrier liquid 21, and the carrier liquid 21 with which many spacers 10 are mixed within this tank is stirred by the propeller 22.

[0011] It is the reservoir of spacer carrier liquid 21, and 23 is open for free passage with the tank 20 through the circulation way 24 connected through seal rubber 31, and with the pump 25 formed in the circulation way 24, from the tank 20, spacer carrier liquid 21 is supplied and it circulates through it.

[0012] The opening board 26 is formed in one reservoir 23 side, two or more openings 27 are formed in this opening board 26, the path of this opening 27 is 20micro, the interval is 80micro, and these values are matches at the breadth of the zone of Above R, G, and B, and the width of face of a black matrix, as mentioned above. A diaphragm 28, the piezoelectric-effect board 29, and the base 30 are established in the another side side of a reservoir 23. 32 is the glass substrate by which orientation processing was carried out, carries out opposite proximity at the aforementioned opening board 26, and is arranged possible [ movement ].

[0013] Drawing 3 shows some equipments of drawing 2. In the equipment of this invention mentioned above, it will elongate in the vertical direction and the piezoelectric-effect board 29 will press a diaphragm 28 toward a lower part, if voltage is impressed. Since the space in which this has held spacer carrier liquid 21 is compressed and spacer carrier liquid 21 is injected from opening 27, the spacer 10 currently mixed into this liquid is also injected together, is applied to a glass substrate 32, and adheres.

[0014] A spacer 10 is a Plastic Ball with a diameter of several microns or a bulb, spacer carrier liquid 21 is mixed liquor of water and isopropyl alcohol (IPA), and about 0.001 cc spacer carrier liquid 21 is injected by one drive of the piezoelectric-effect board 29 from one opening 27.

[0015] If follow, for example, will make  $11. / 0.001 \text{ cc} = 106$  spacers 10 mix, and will stir with a propeller 22, if the amount of the whole spacer carrier liquid 21 is 11. (liter), and it is made to distribute in carrier liquid 21 as equally as possible and is made not to stay with a pump 25, a spacer 10 can be injected from opening 27 at intervals of 80micro to a glass substrate 32. If the horizontal displacement of the glass substrate 32 is perpendicularly carried out to the train of opening 27 and the piezoelectric-effect board 29 is driven a suitable period at this time, a spacer 10 can be applied only to the position corresponding to the part of the black matrix of a light filter as shown in drawing 1. in addition. It is good to decompress or pressurize this carrier liquid according to the viscosity of the spacer carrier liquid 21 in a tank 20, surface tension, specific gravity, etc.

[0016]

[Effect of the Invention] According to this invention, as explained above, since a spacer can be applied only to the position on the glass substrate corresponding to the black matrix of a light filter, it also becomes that coloring of a color decreases without unevenness arising, and the practical effect is great.

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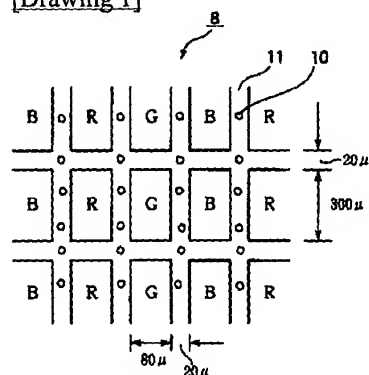
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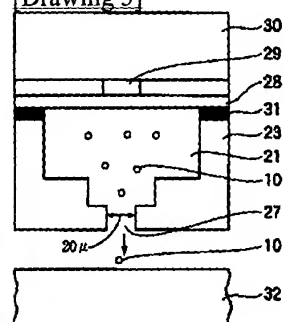
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DRAWINGS

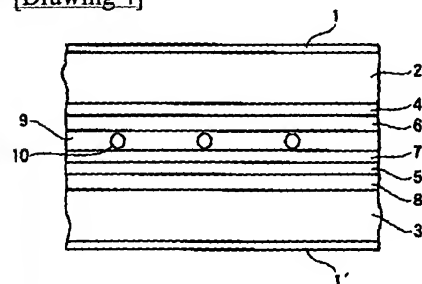
[Drawing 1]



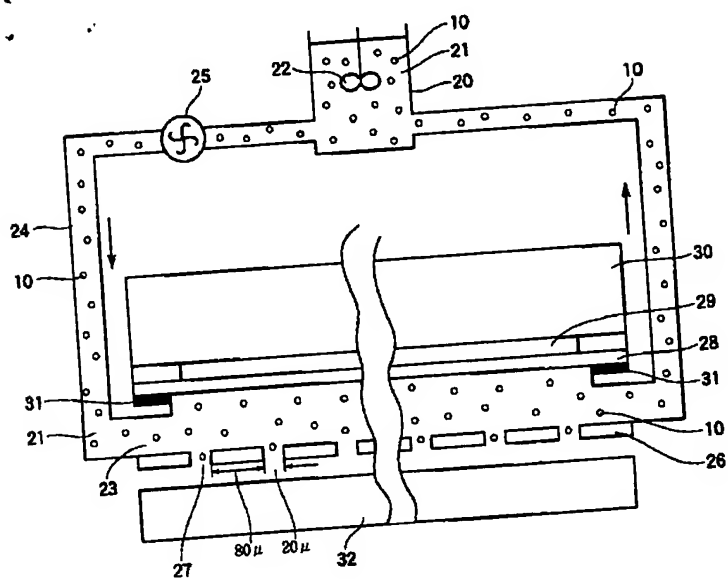
[Drawing 3]



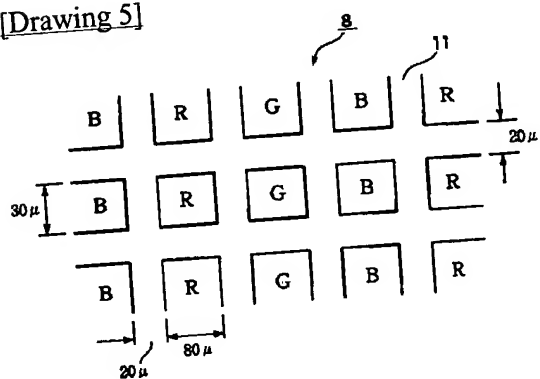
[Drawing 4]



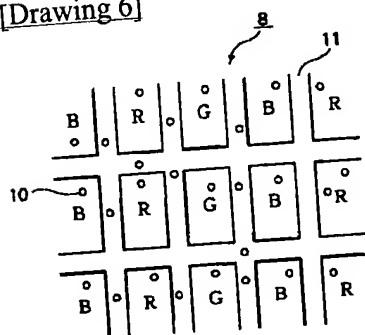
[Drawing 2]



[Drawing 5]



[Drawing 6]



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